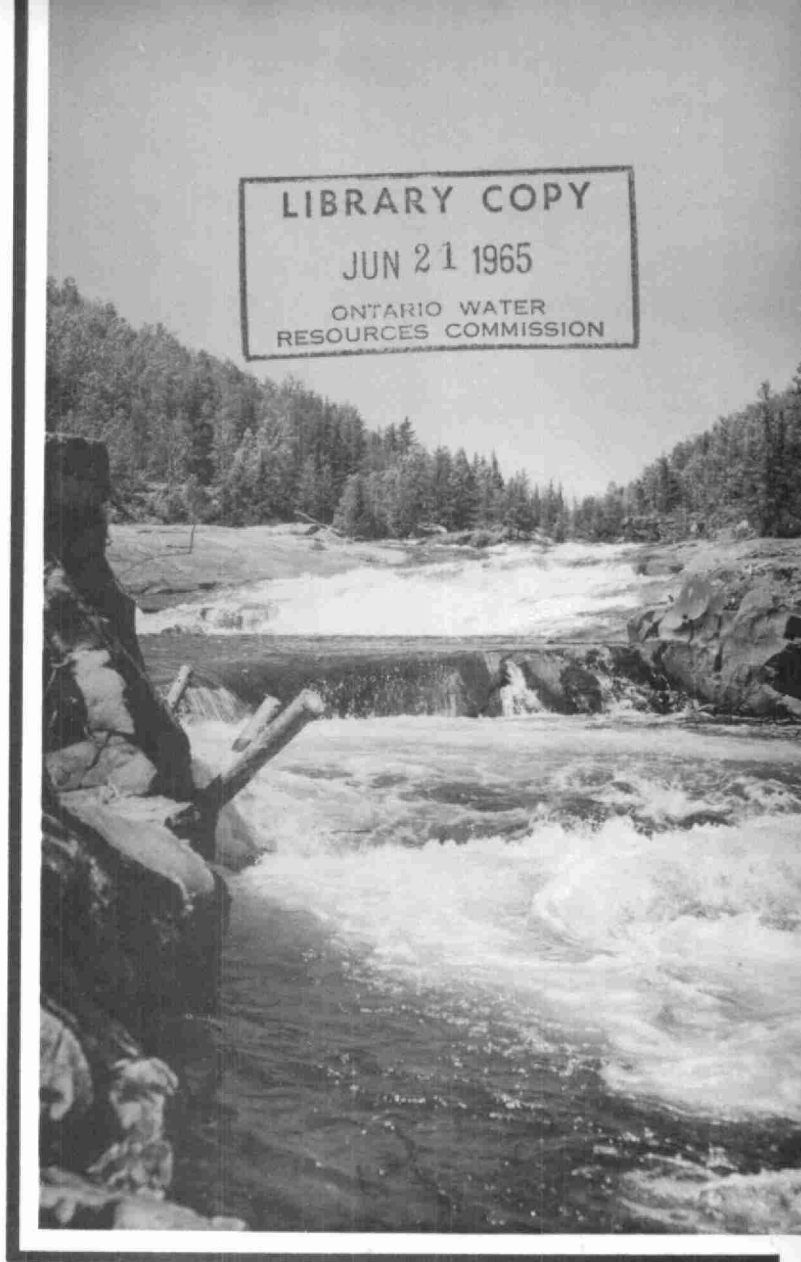


*Fergus
Sewage
Treatment
Plant*



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ONTARIO WATER
RESOURCES COMMISSION

1963 Annual Report

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Ontario Water Resources Commission

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ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

Mayor and Members of Council,
Town of Fergus.

Gentlemen:

I am pleased to submit, for your information, the 1963 Annual Operating Report of the Fergus Sewage Treatment Plant, OWRC. Project 58-S-23, which has been prepared by our Division of Plant Operations.

We are grateful for the kind cooperation which you and your staff have extended to our Operations staff throughout the year. We look forward to a continuing close association with you in our mutual endeavour to control pollution.

Yours very truly,

A handwritten signature in dark ink, appearing to read "D. S. Caverly", is written over the typed name.

D. S. Caverly,
General Manager

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227
F47
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1963
MOE

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General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Fergus Sewage Treatment Plant, OWRC Project No. 58-S-23 for 1963.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B. C. Palmer,
Director,
Division of Plant Operations

foreword



This report is designed to present the highlights of the operation of these works during 1963. Trends in flows and other operating data can be extremely useful in the development of necessary long range enlargement and improvement programs.

In addition to the activities reported herein, much unrecorded effort has contributed to the success of this operation. The municipality, through representatives on the Local Advisory Committee, have given valuable assistance in reviewing salary schedules, detailed operating budgets, personnel problems, flow patterns, and major maintenance problems.

The Division of Plant Operations has provided direction to the field staff in administrative procedures, quality control, maintenance schedules, equipment inspection and purchase supervision. A number of other Divisions of the Commission have been of service. The Division of Construction has offered helpful advice on equipment selection and renovation problems. The Division of Sanitary Engineering has maintained, through its District Engineering staff, a keen interest in the operation and has made a number of constructive recommendations. Its operator training courses have been very helpful. The Division of Finance has processed many payrolls, purchase orders and invoices dealing directly with this project. The Commission Personnel Director has been most helpful in the selection of new staff.

The excellent cooperation of all of these groups is gratefully acknowledged.

B. C. Palmer

B. C. Palmer,
Director,
Division of Plant Operations



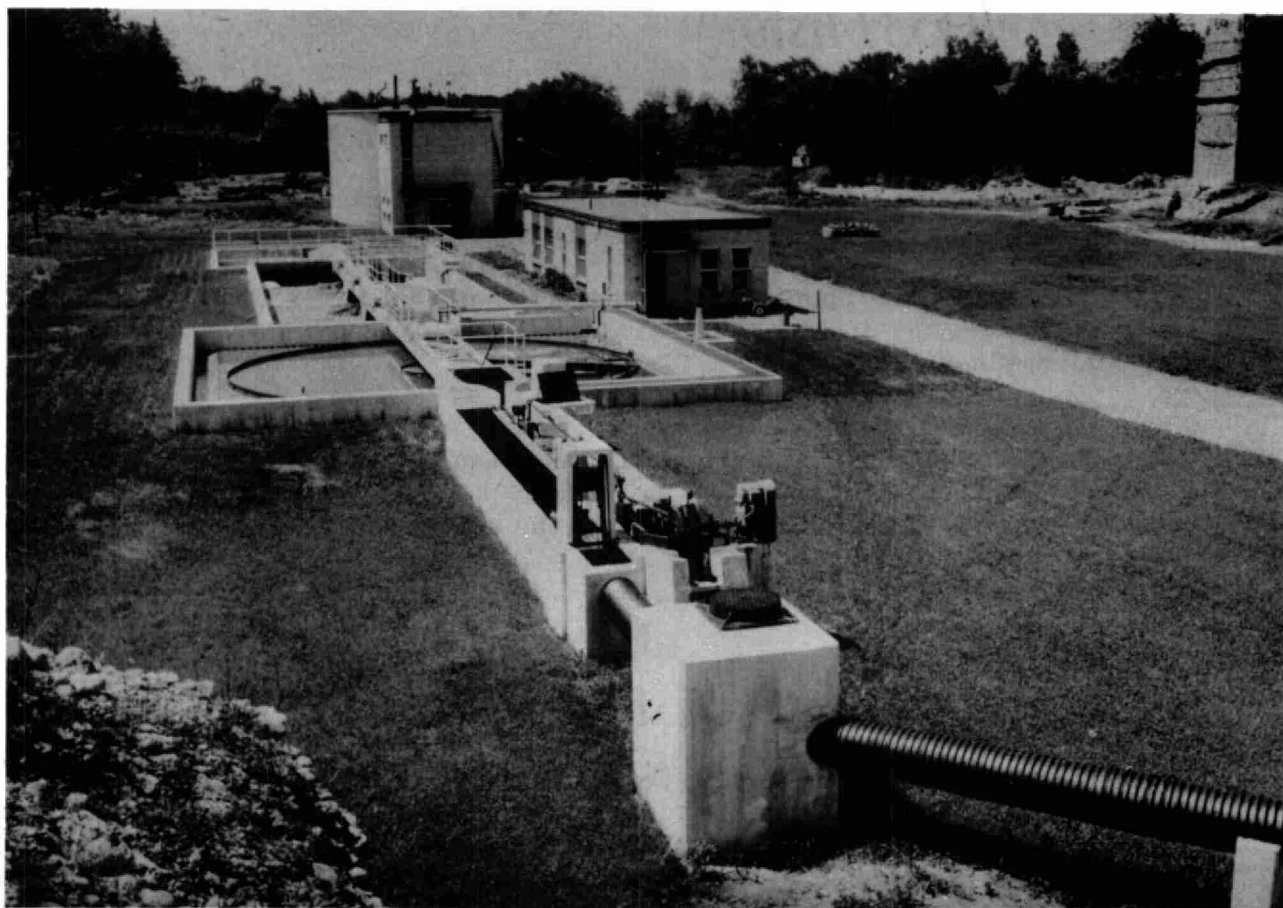
DIVISION OF PLANT OPERATIONS

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Total Costs.....	Inside back cover

C. W. Perry
Assistant Director
A. C. Beattie
Regional Supervisor
B. G. Porter
Operations Engineer

FERGUS SEWAGE TREATMENT PLANT



OPERATED FOR
THE TOWN OF FERGUS
BY

THE ONTARIO WATER RESOURCES COMMISSION

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COMMISSIONERS

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J. H. H. Root, M.P.P.
J. A. Vance, LL. D., P. Eng.
A. A. Wishart, Q. C., M.P.P.

GENERAL MANAGER

D. S. Caverly

ASSISTANT GENERAL MANAGERS

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COMMISSION SECRETARY

W. S. MacDonnell

1958^{to} 1963 History

INCEPTION

In 1958, the Town of Fergus and the Ontario Water Resources Commission initiated plans for the construction of a modern sewage treatment plant.

The firm of Proctor and Redfern, Toronto, Ontario, Consulting Engineers, was engaged to prepare plans and specifications for the project.

APPROVAL

On December 19, 1958, the Town of Fergus signed an agreement with the Ontario Water Resources Commission to finance, construct and operate the plant.

CONSTRUCTION

Canadian Engineering & Contracting Company of Hamilton, Ontario began construction in 1959 and by the summer of 1959 the Division of Plant Operations had placed the plant in full operation.

TOTAL COST

\$277,393.00.

Project Staff



R. Bridge,
Chief Operator

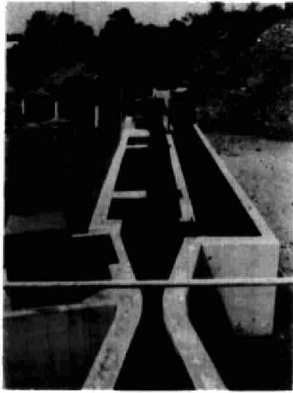
COMMENTS

During the initial stages of the project, it was decided that the proper complement of manpower to operate this plant would be 1.75 men. This being impractical, it was agreed that Mr. Bridge could be employed by the municipality as Plumbing Inspector for up to two hours per normal working day. Increased maintenance and repair, construction of a final effluent spray system and considerable exterior painting will provide ample full time work for both operators this summer.

The plant is staffed ten hours per day from Monday through Friday and for two hours on Saturday and Sunday mornings.

Both operators attended, and successfully completed, sewage works courses presented by the Water Resources Commission in Toronto. Mr. R. Bridge graduated from the Senior Operators' Course and received his certificate. Mr. A. Carlaw completed the Basic Course in operating.

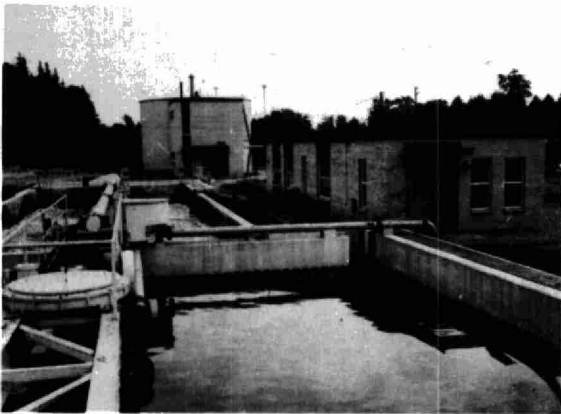
Description of Project



Sewage enters the plant via an 18" sewer and bar minutor which cuts and shreds the form of sand and grit is removed by a Dorr Oliver Type T detritor. This unit has a manually cleaned by-pass channel to

facilitate repairs. After grit removal, the raw sewage passes through a 6" Parshall flume connected to a metering device which records the rate of flow and total flow for each day.

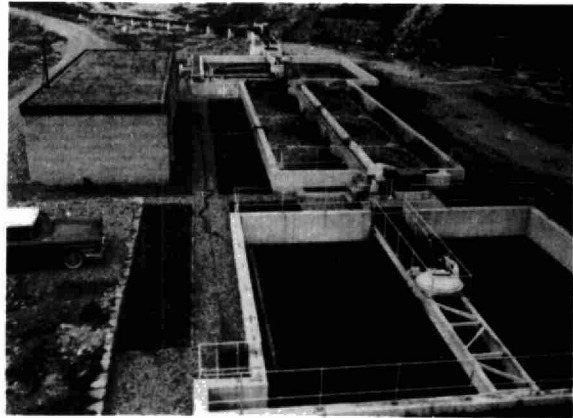
Storm flow in excess of about 1 MGD by-passes the influent works and is directed through two formerly existing septic tanks and the chlorine contact chamber before discharging to the river.



PRIMARY SEDIMENTATION TANK

Primary sedimentation is provided by one 40' square concrete tank with a 9' SWD equipped with a Dorr-Oliver rotary scraper mechanism. A detention time of 3.6 hours at design flow is provided. Flow in excess of 0.9 MGD is by-passed to the effluent sewer.

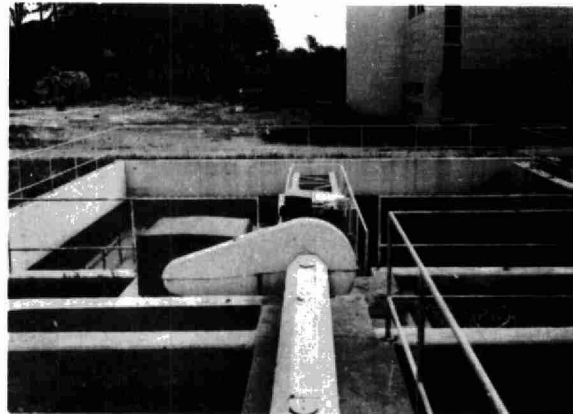
The function of this tank is to remove the organic solids that will settle or float. Scraping mechanisms collect this "raw sludge" which is pumped to the digestion tank.



AERATION

The aeration tank consists of three units each 24' square with a 10'8" SWD. A retention time of 4.41 hours is provided at the design flow of 0.6 MGD.

Air is supplied by "Simplex" mechanical aerators; each unit is provided with one of these high intensity aerators.



FINAL SEDIMENTATION TANK

The aerated mixed liquor is retained for approximately 2.2 hours in a 35'

square concrete final sedimentation tank with a 9' SWD. Activated sludge containing the solids absorbed by bacterial action in the aeration section settles out in this tank. A Dorr-Oliver rotary scraper mechanism is used to collect the sludge part of which is returned to the head of the aeration section for continued bacterial action and part of which is wasted to the digester.

The liquid which flows over the final clarifier weir plate is chlorinated in the chlorine contact chamber and flows to the river as plant effluent.



SLUDGE DIGESTION TANK

Single stage digestion is provided by the 35' diameter by 22' SWD digestion tank. This 22,700 cubic foot capacity digester is equipped with Dorr-Oliver floating cover and a draft tube mixer. The

sludge is heated to the required temperature for digestion by a Pacific Flush Tank Company heat exchanger which is located in the digester building.

Methane gas is stored under the floating cover and is used as fuel.



The digested sludge is directed to sand beds for drying and later disposed of on local farms as a soil conditioner. The drying beds have a total area of 7,200 square feet.

CHLORINATION

Plant effluent is chlorinated in this chamber from a 200 lb/24 hours capacity Builders Providence gas chlorinator.

The contact chamber gives a contact time of 15 minutes.

Design-Data

GENERAL

Type of Plant - Activated sludge.

Design Population - 4,700

Design Plant Flow - 0.6 MGD.

Per Capita Flow - 128 IGPD.

Five Day BOD -

Raw Sewage	-	200 PPM
Removal	-	90%

Suspended Solids -

Raw Sewage	-	200 PPM
Removal	-	90%

PRIMARY TREATMENT

Grit Removal

Dorr-Oliver Type T Detritor

Screening

18" Chicago model "B" barminutor.

Primary Sedimentation Tank

One - 40' square tank with circular mechanical sludge removal facilities.

AERATION SECTION

One - Size - 24' x 72' x 10'7" SWD.

Volume - 22,080

AERATION SECTION - Continued

Retention - 4.41 hours @ 0.6 MGD.

Type - Simplex Mechanical Aerators - Ames Crosta.

FINAL SEDIMENTATION TANK

One - Size - 35' square x 9' SWD equipped with Dorr-Oliver rotary scraper.

Volume - 11,025 cubic feet.

Retention - 2.2 hours @ 0.6 MGD and 25% return sludge.

CHLORINE CONTACT CHAMBER

One - volume - 911 cubic feet.

Retention - 15 minutes at design.

Capacity - 200 pounds per 24 hours.

DIGESTION SYSTEM

One - heated primary digester.

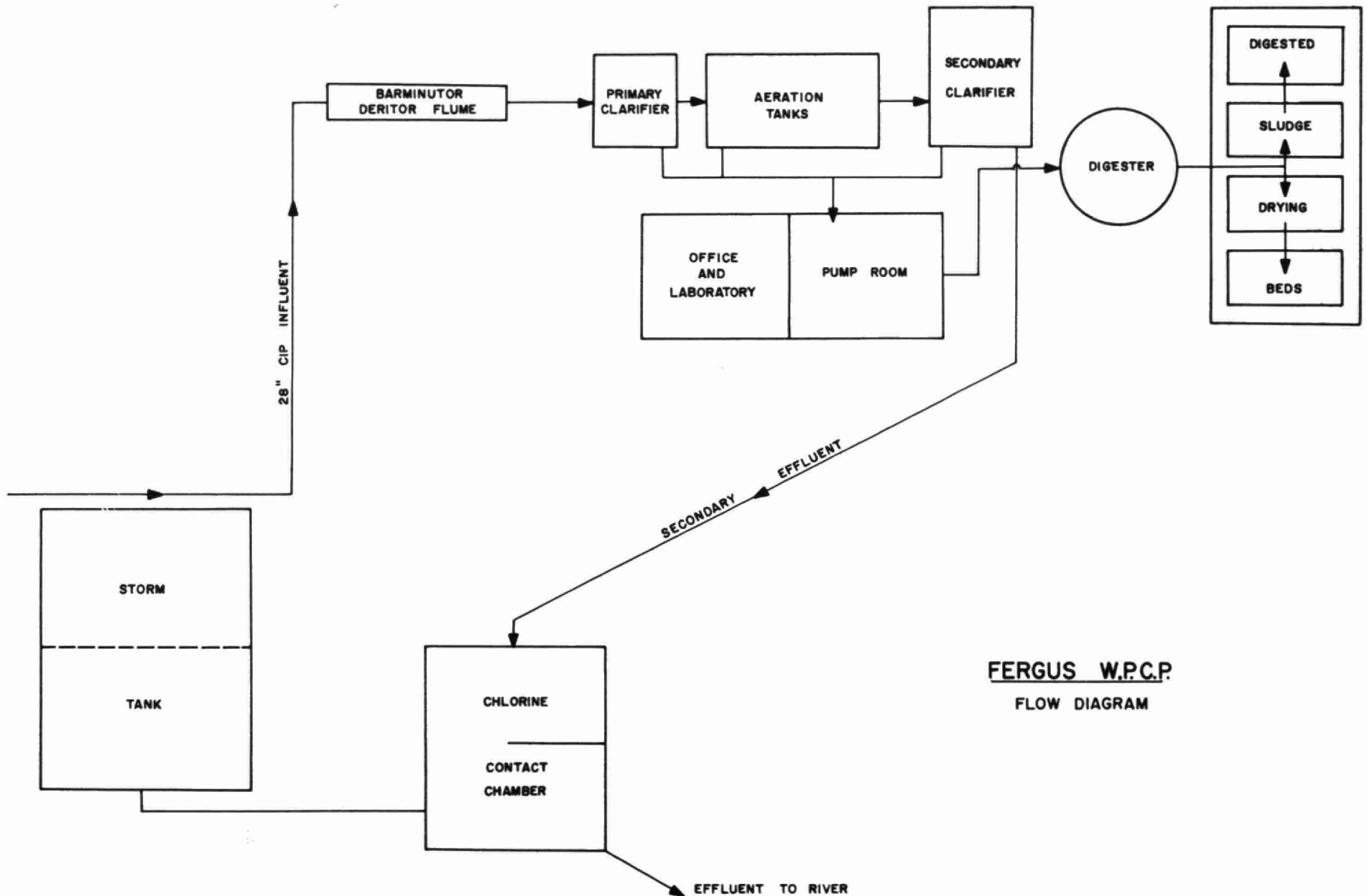
Size - 35' diameter x 22' SWD.

Volume - 22,700 cubic feet.

Capacity - 4.8 cubic feet per capita.

Dorr-Oliver floating cover.

Draft tube mixer.



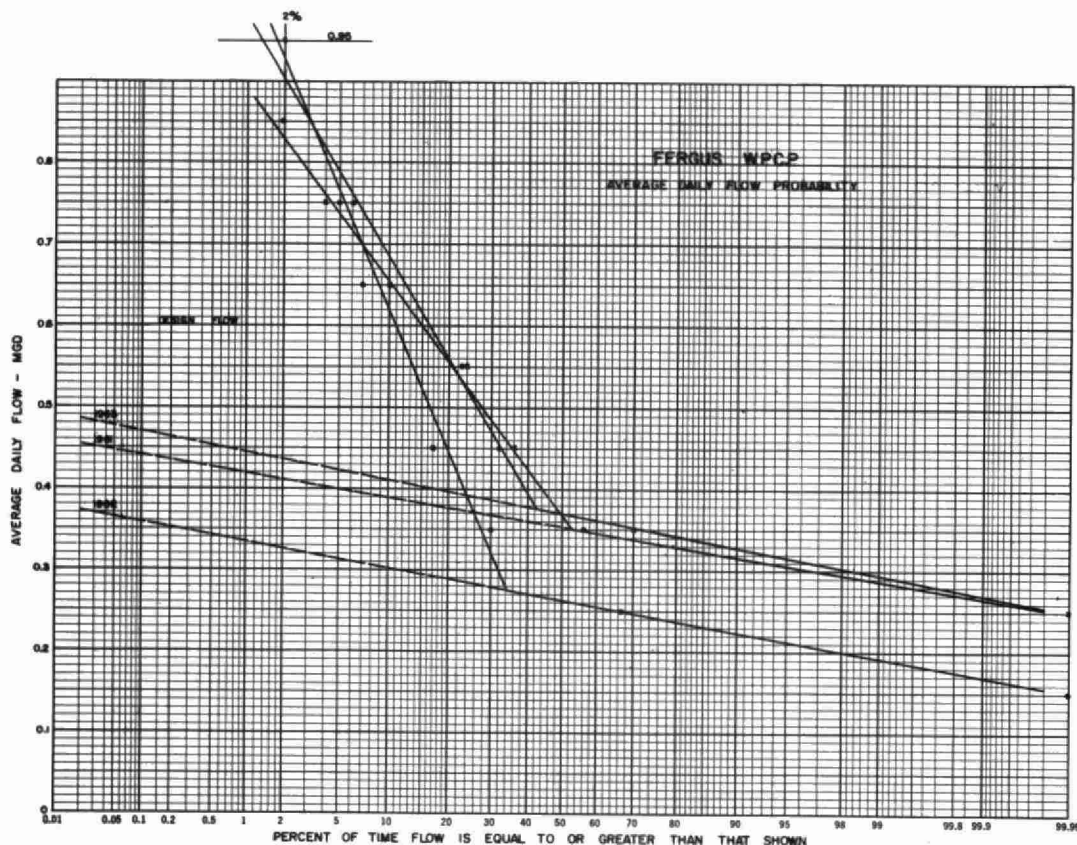
FERGUS W.P.C.P.
FLOW DIAGRAM

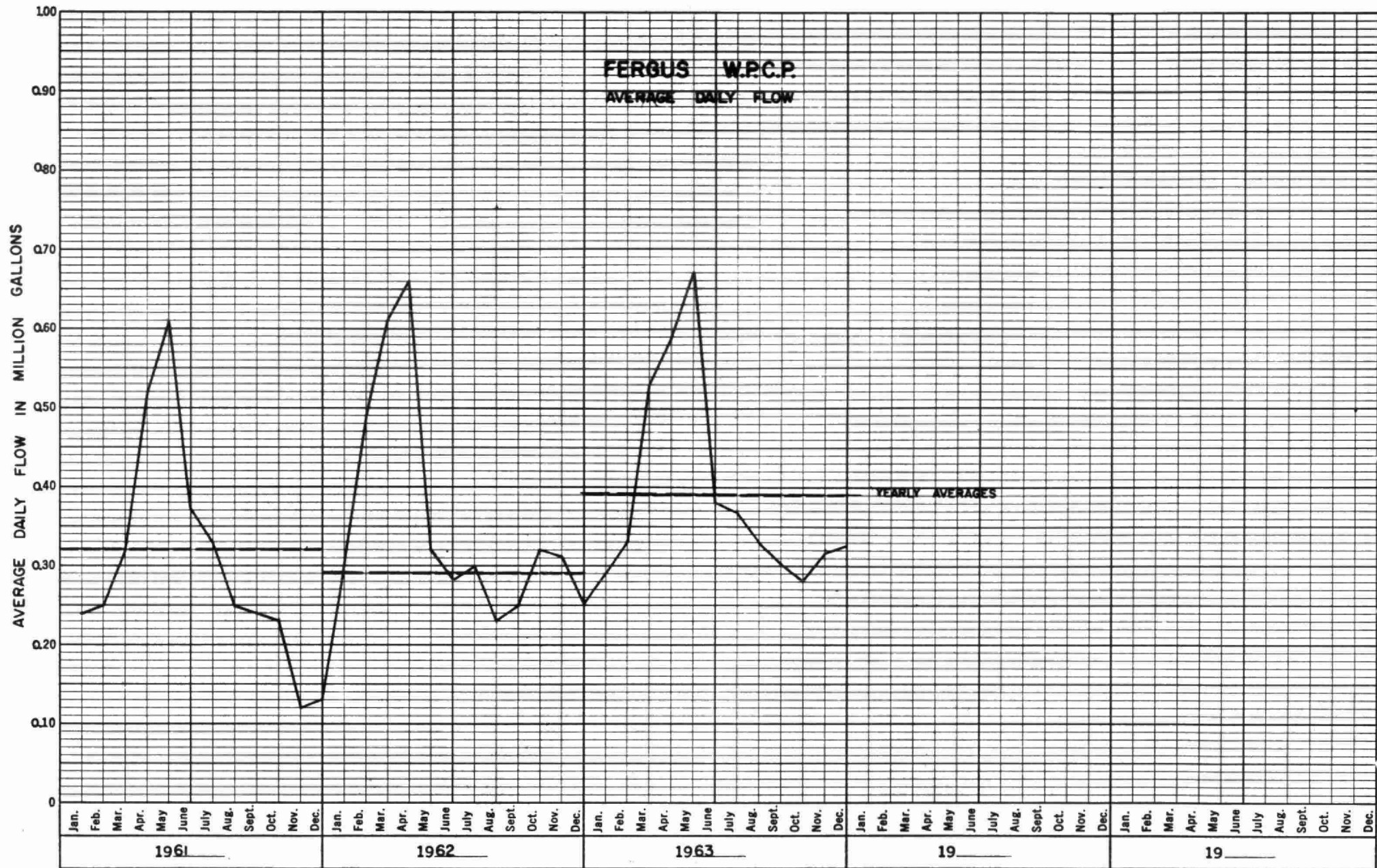
Process Data

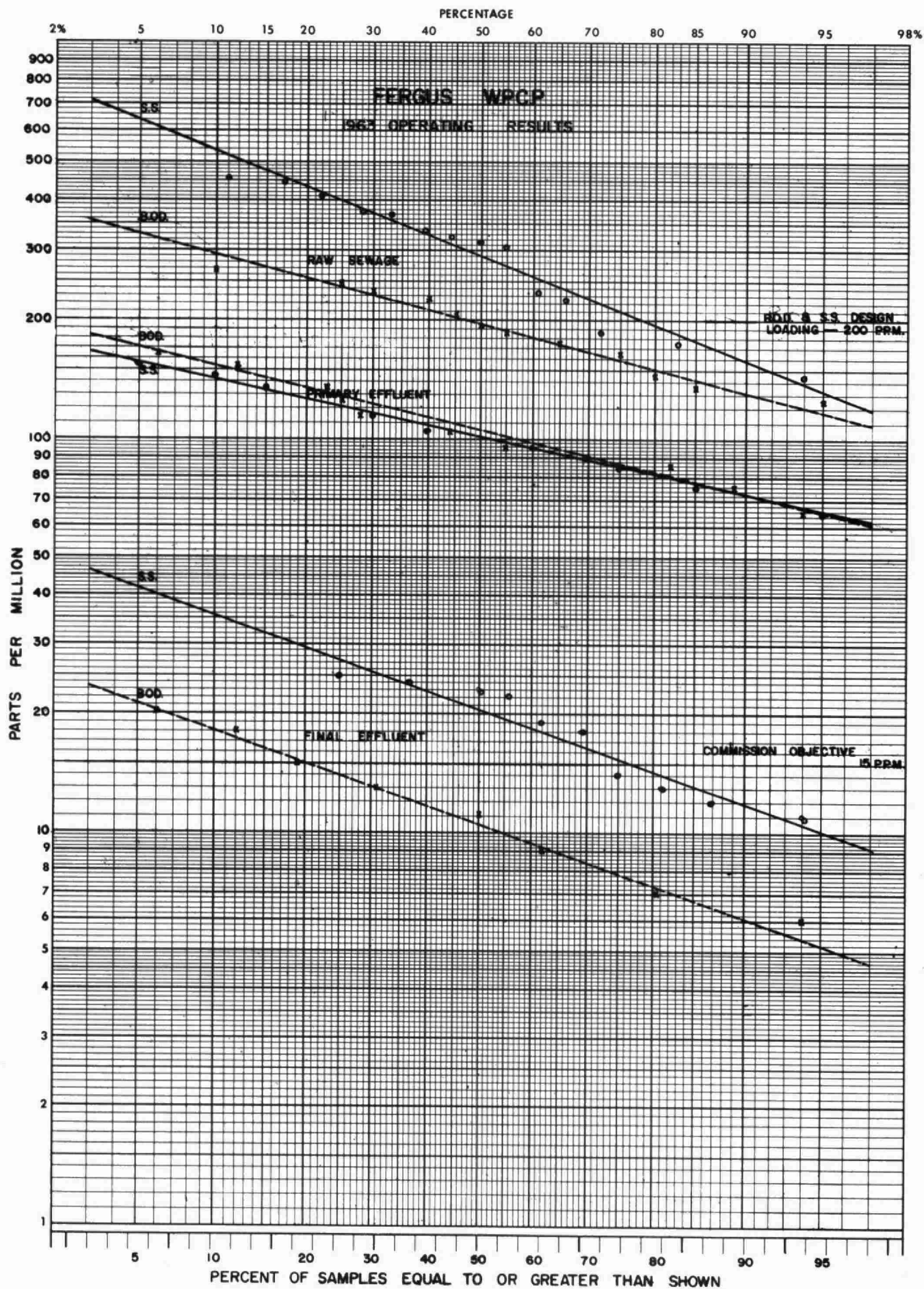
The average daily flow and total flow for the year were considerably higher than the 1962 flows. During 1963, the average daily flow was 0.392 million gallons as compared to 0.292 million gallons per day in 1962. This is an increase of about 34% and is due to additional domestic connections. During the past year, 143 million gallons of combined industrial and domestic flow received complete treatment.

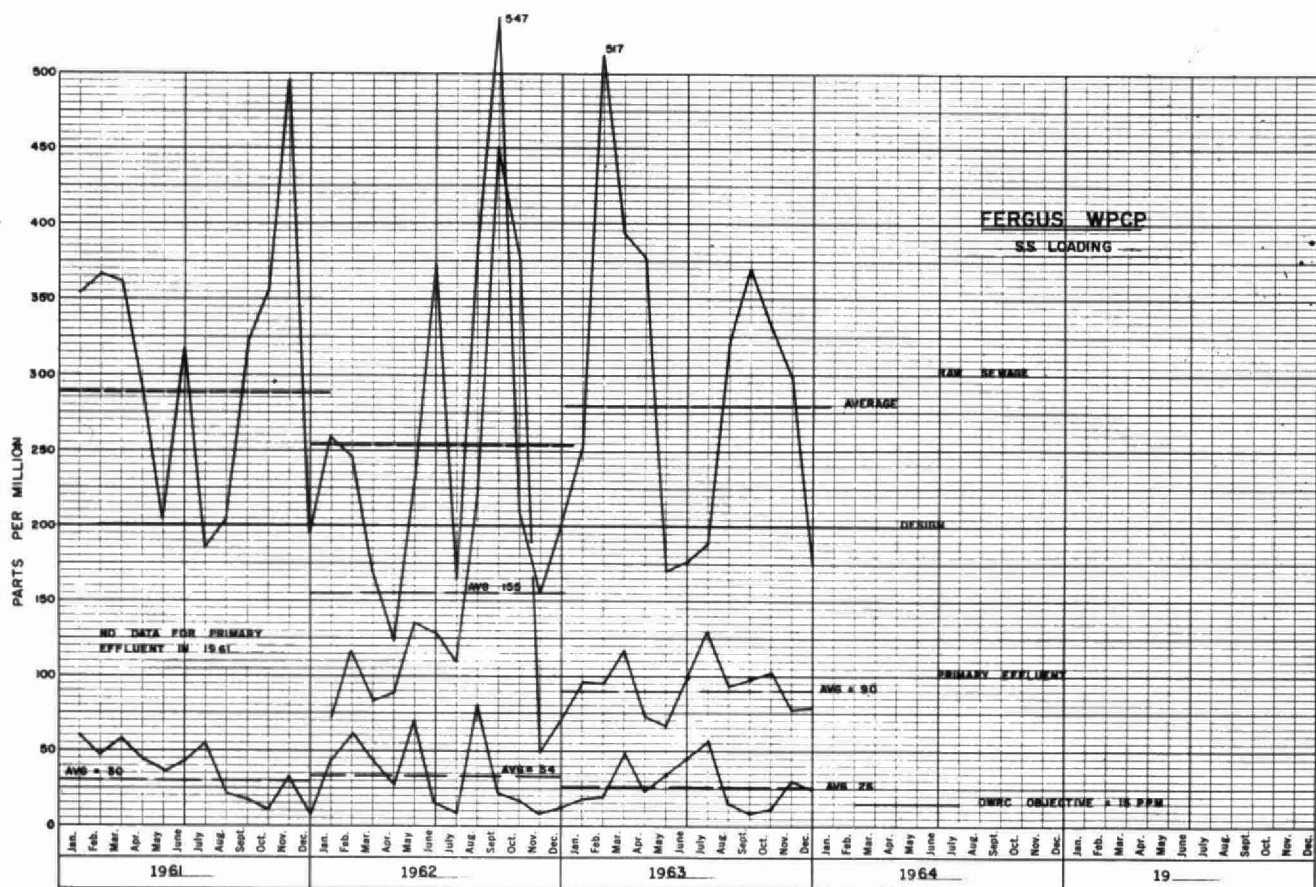
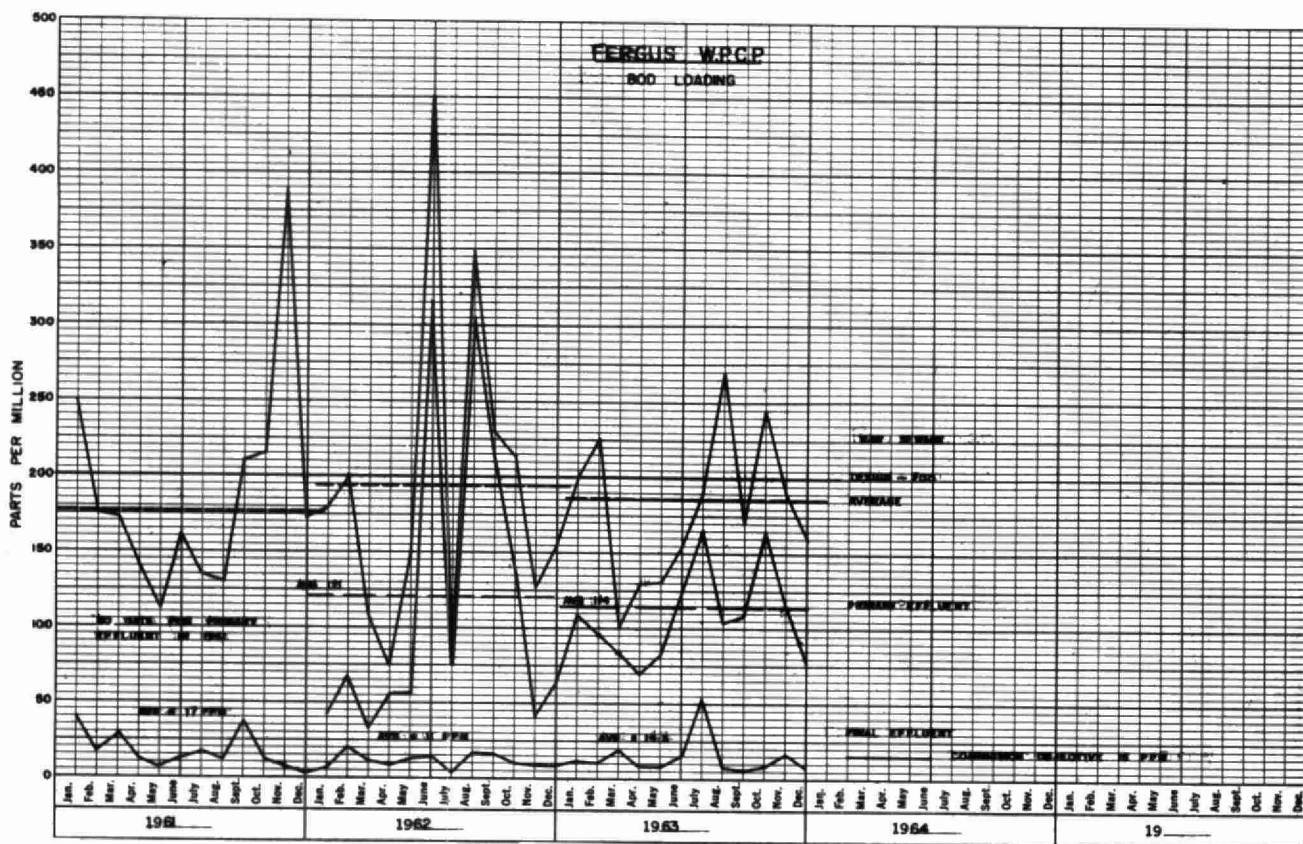
The maximum 24 hour flow was 1.34 million gallons. These high flows occur during the spring and necessitate by-passing that portion of the flow 1.0 million gallons per day. The by-passed flow receives sedimentation in the old septic tank and chlorination prior to discharge to the river.

The following graph indicates the variation in flow which occurs at the Fergus Sewage Treatment Plant. The flow probability lines are formed by two straight line segments. Approximately 50% of the time the flows are greater than normal dry weather flow. The extension of dry weather flow lines is shown on the graph by dotted lines. The relatively high percentage of the time that flows are greater than dry weather flow indicates that there is direct storm water connections to the sanitary sewers.







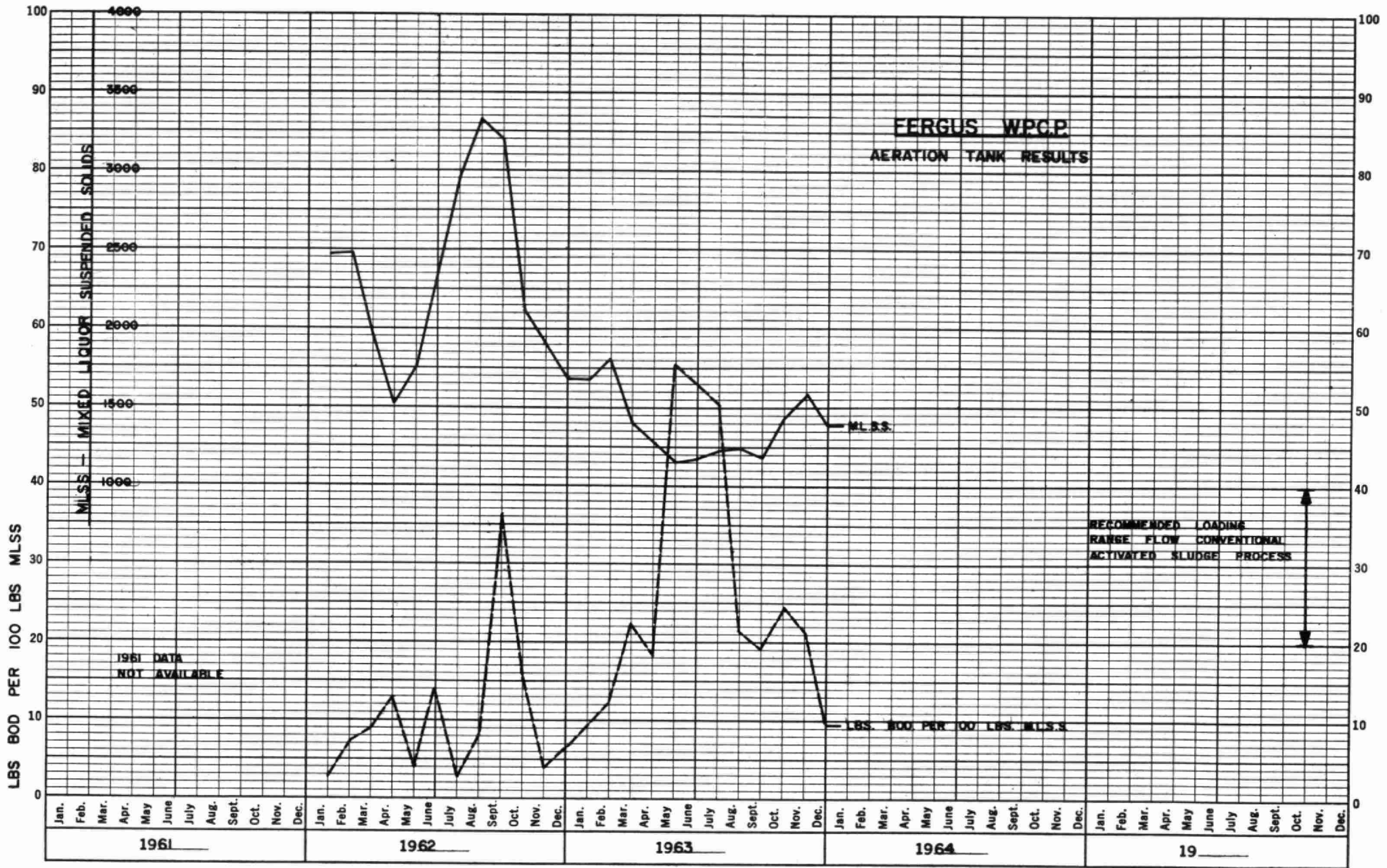


GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	200	12	94.0	-	252	18	93.0	-	5
FEB.	227	10	95.5	10.02	517	18	96.5	23.05	0
MAR.	101	18	82.0	6.86	193	49	74.5	11.90	12
APR.	128	7.6	93.5	10.69	376	24	93.5	31.27	11
MAY	130	-	-	-	170	-	-	-	2
JUNE	154	-	-	-	177	-	-	-	4
JULY	188	53	72.0	7.67	188	56	70.0	7.50	6
AUG.	268	7	97.5	13.38	321	15	95.5	15.68	4
SEPT.	170	5.6	96.5	7.50	369	9	97.5	16.35	9
OCT.	245	7.2	97.0	10.39	331	12	96.5	13.94	6
NOV.	190	16	91.5	4.67	298	30	90.0	12.79	7
DEC.	160	8.8	94.5	7.62	176	25	85.5	7.61	3
TOTAL	-	-	-	78.79	-	-	-	139.28	69
AVG.	180	14.5	91.4	8.75	280	25.6	89.2	15.47	5.75

COMMENTS

The average suspended solids loading is in excess of design and, consequently, the effluent suspended solids exceed Commission standards on occasion. The average BOD in the final effluent is superior to the Commission standard of 15 ppm. The suspended solids loading is aggravated by storm flows which flush many stable solids into the plant.



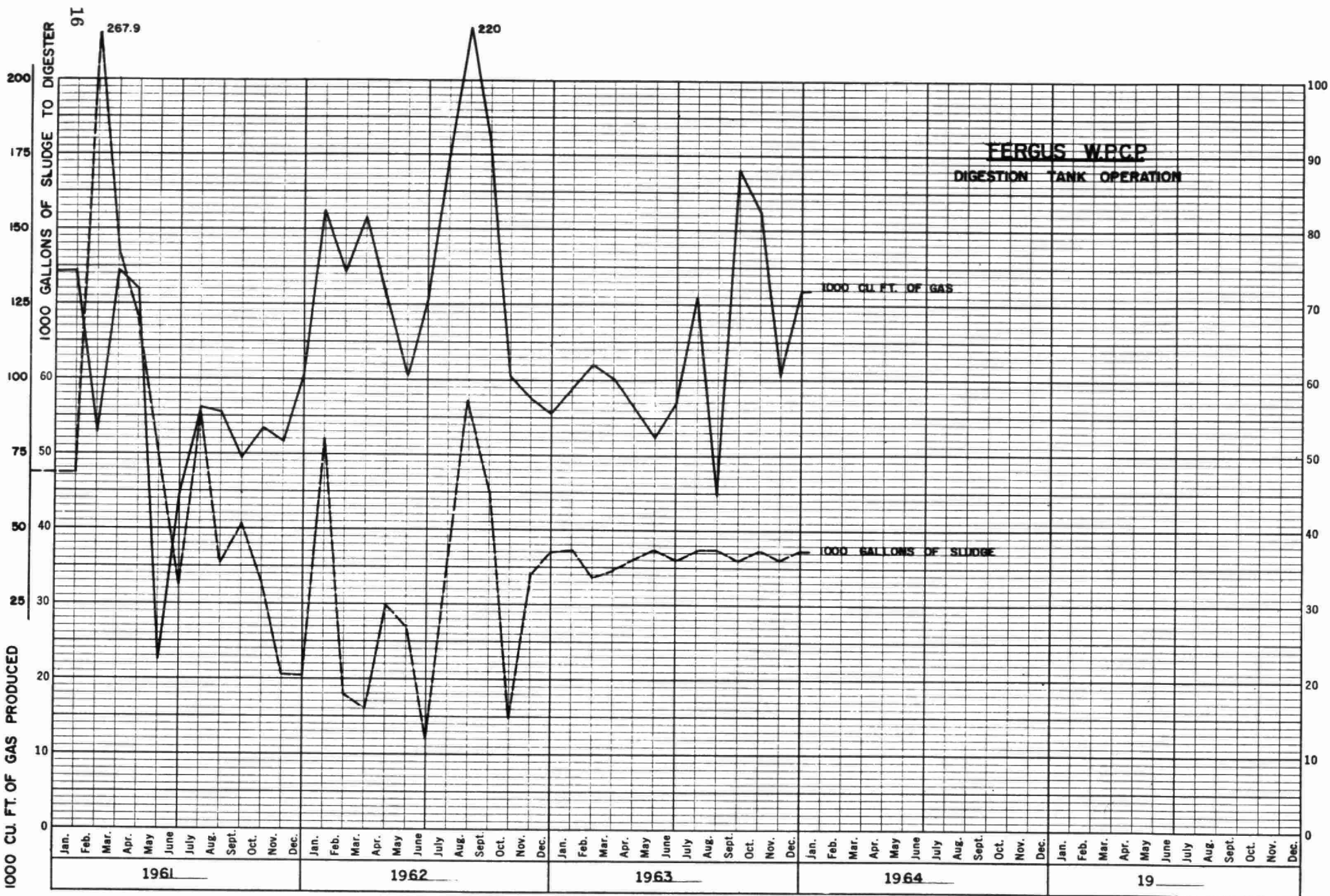
AERATION SECTION

MONTH	PRIM. EFFL. B.O.D. PPM.	MLSS. PPM.	LBS. BOD. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	108	1694	-	M
FEBRUARY	96	1791	12	E
MARCH	84	1392	22	C
APRIL	70	1274	18	H
MAY	88	1157	37	A
JUNE	-	1173	-	N
JULY	244	1211	50	I A
AUGUST	104	1238	21	C E
SEPTEMBER	108	1196	19	A R
OCTOBER	165	1435	24	L A
NOVEMBER	114	1575	21	T
DECEMBER	76	1393	9	I
TOTAL				0
AVERAGE	114	1377	23.3	N

MLSS - MIXED LIQUOR SUSPENDED SOLIDS

COMMENTS

Mechanical aeration is employed at Fergus. The quantity of air supplied by these aerators can be theoretically estimated but cannot be established from day to day as it can with conventional diffused air aeration. The available dissolved oxygen in the aeration effluent indicates, however, that sufficient air supplies are available for efficient operation of this section of the plant. The air supply can be regulated through changing the depth of immersion of the aerators by adjusting the aeration section overflow weir.



DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			% VOL. MAT IN DIGESTED SLUDGE	GAS PRODUCED 1000'S CU. FT.	SLUDGE FROM DIGESTER 1000'S GALS
	1000'S GALLONS	% SOLIDS	% VOL. MAT.			
JAN.	21.0	4.14	-	-	96.97	17.0
FEB.	19.0	3.41	-	2.68	105.66	14.0
MAR.	19.8	-	-	-	101.32	15.0
APR.	20.3	6.42	63.5	3.00	92.20	13.0
MAY.	21.0	3.94	-	2.70	82.27	20.0
JUNE	20.3	-	-	-	93.40	8.0
JULY	21.0	4.76	-	-	128.38	15.0
AUG.	21.0	6.79	-	-	63.86	16.0
SEPT.	20.3	3.44	-	-	170.24	37.0
OCT.	21.0	3.86	-	-	156.86	24.5
NOV.	20.3	3.92	-	-	113.50	28.0
DEC.	21.0	-	-	2.99	133.96	14.8
TOTAL	246.0		-		1338.65	222.3
AVG.	20.5	4.52	-	2.84	111.55	18.7

COMMENTS

During 1963, a total of 246,000 gallons of sludge was pumped to the digester. Approximately 222,300 gallons of digested sludge was removed and the remaining 23,700 gallons were returned to the treatment process as supernatant liquid. Digested sludge is disposed of by drying on sand drying beds and using the dried sludge as a soil conditioner.

Gas production for the year averaged over 0.9 cubic feet per capita per day, which indicates efficient digestion process. Over one million cubic feet of gas was utilized for heating purposes during the year.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	8,344		
FEBRUARY	9,238		
MARCH	16,529		
APRIL	17,764		
MAY	20,770	40	
JUNE	11,454	627	5.5
JULY	11,359	424	3.7
AUGUST	10,252	512	5.0
SEPTEMBER	9,083	468	5.2
OCTOBER	8,738	465	5.3
NOVEMBER	9,510	450	4.7
DECEMBER	10,079	387	3.9
TOTAL	143,120	3333	
AVERAGE	11,927	476	4.7

COMMENTS

During 1963, our Division of Sanitary Engineering carried out extensive surveys on the Grand River watershed and recommended that year-round chlorination should be practiced at all plants in this area.

The dosage rate is based on the immediate chlorine demand in order to maintain a residual of 0.5 ppm after 15 minutes of contact time.

1963

PLANT

Total Operating Costs

MONTHLY

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	946.08	618.78		132.16	143.88		14.06		37.20		
FEB	871.50	605.97		86.35	87.00		44.15		22.00	26.03	
MARCH	1131.35	666.60		193.90	82.55		120.41		34.40	33.49	
APRIL	874.30	623.72		90.07	89.30		24.58		18.50	19.13	
MAY	1008.36	623.72			82.55	4.44	21.44	15.33	97.72	163.16	
JUNE	914.66	623.72			73.64		152.10		29.04	117.56	
JULY	1802.33	935.58			96.95	574.03	159.54		6.52	29.71	
AUG	819.63	623.72			90.25		71.17		14.53	105.96	
SEPT	793.23	623.72			90.25		42.68		26.00	96.58	
OCT	1443.92	623.72			79.08	440.23	93.12		59.34	12.53	135.90
NOV	705.76	623.72			87.00	(350.00)	23.60		60.07	261.37	
DEC	1401.55	935.58		96.42	82.55		40.67	(13.43)	167.54	120.20	
TOTAL	12730.66	8128.55		607.91	1085.00	668.70	807.52	1.90	572.86	732.32	135.90

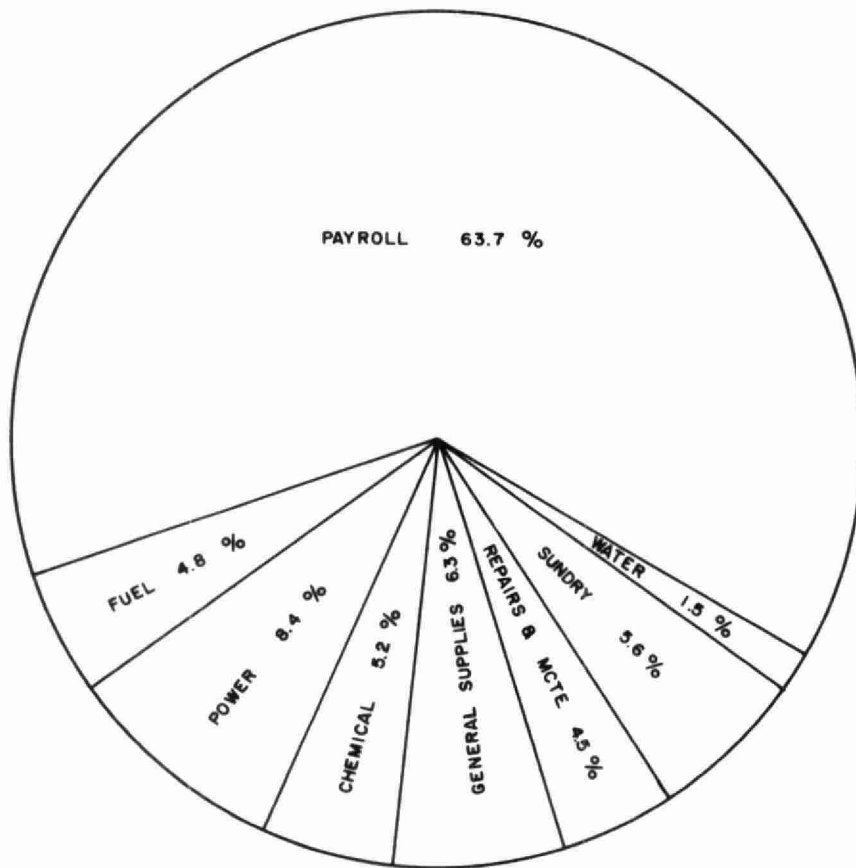
PLANT

YEARLY

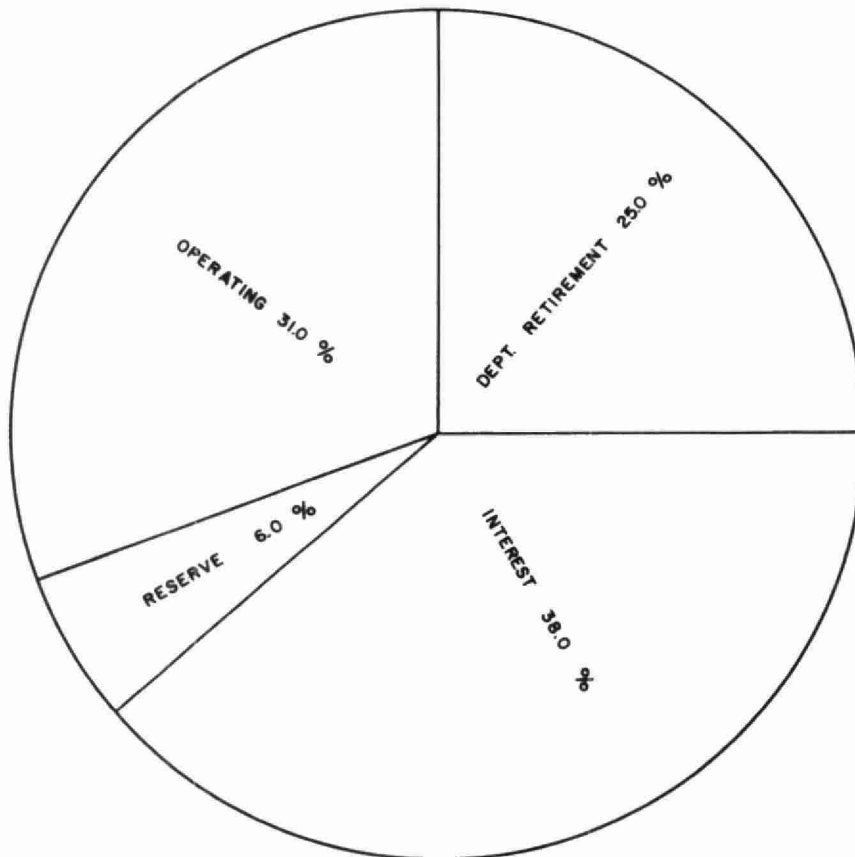
YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER CAPITA PER YEAR
1961	118.82	\$11,201.00	\$ 94.25	\$ 2.83
1962	106.77	\$12,021.00	\$112.50	\$ 3.04
1963	143.12	\$12,730.66	\$ 88.83	\$ 3.22
COST/CAPITA BASED ON 1963 MUNICIPAL DIRECTORY POPULATION OF 3,950 PERSONS				

FERGUS W.P.C.P.

1963 OPERATING COSTS



1963 TOTAL ANNUAL



SUMMARY

This report has given in detail significant data on the operation of the various treatment units at the Fergus Sewage Treatment Plant.

With an average daily flow of 0.392 million gallons, the plant is still below its full treatment capacity of 0.6 million gallons per day. The gradual increase in flow is expected to continue during 1964 as more homes will be served by the sanitary sewer system. Flows approaching twice the design flow occur during spring break-up causing many operating difficulties. As the dry weather flow increases, providing additional storm flow connections are eliminated, the high flows will become less of a problem.

Due to increased flow, the sludge production has increased from 2.4 million gallons in 1962 to 4.4 million gallons in 1963. The odours caused by drying this sludge on outside beds during the summer and the problem of finding space to store the sludge produced during the winter may necessitate contracting the haulage of liquid sludge in the near future.

Odours, in general, from the Fergus plant have not been as noticeable during 1963 as they were in 1962. Increased control in drying sludge, together with increased flow providing greater dilution to obnoxious wastes in the influent works, have contributed to the success in odour control.

The operating costs have continued to increase due to increased cost of labour supplies and maintenance. This trend is expected to continue in pace with the general costs of living.

An addition to the plant equipment in the form of a final effluent lawn watering and defoaming system is expected to contribute to the aesthetic qualities of the grounds and the aeration section. A substantial amount of painting, planned for the summer of 1964, will also improve the plant appearance.

Under the constant supervision of head office engineers, the plant staff has maintained a clean, attractive and efficient plant for the Town of Fergus. It is the intent of the Commission to continue to maintain and, if possible, improve this efficiency.



Total 1963 Costs

The total cost to the municipality during 1963 was as follows:

Operating.....	\$ 12,730.66
Debt Retirement.....	\$ 10,440.00
Reserve.....	\$ 2,200.00
Interest.....	<u>\$ 15,625.66</u>
TOTAL	<u><u>\$ 40,996.32</u></u>

Note: The amount in the reserve account as of December 31st, 1963 was \$8,425.32.

Based on a population of 3,950, the total annual cost of the Fergus Sewage Treatment Plant was approximately \$10.38 per person.

DATE DUE		

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Division of Plant Operations

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